Department of Electrical and Computer Engineering
The Johns Hopkins University
520.648 Compressed Sensing and Sparse Recovery – Spring 2017

Homework Assignment VII

Computer Assignment:

Implement the following two face-recognition algorithms as described in Lecture:

- Eigenface or more precisely, Eigenfaces with S-nearest neighbors (S-NN). In other words, based on the S (say $S = 10$) closest matches in the eigenface domain, construct a simple voting scheme to identify the identity of the person.
- Sparse Representation Classification (SRC).

The database that we will use to evaluate the performance of your algorithms is the Extended Yale Face Database B which contains 38 human subjects under different poses and illumination conditions. To reduce the computational complexity, we will only experiment with the cropped database whose images have been manually aligned, cropped, and then re-sized to 96×84. This database can be downloaded from our Lectures directory:
http://thanglong.ece.jhu.edu/Course/648/Lectures/CroppedYale_96_84_2414_subset.mat

The database is stored in one single 3D array named *faces* of size $2414 \times 96 \times 84$. The associated file *facecls* contains the ground-truth information (the correct class) of each face in the database. Also found in the Lectures directory are the original papers on Eigenfaces, Fisherfaces, and Sparse-Representation-based Classification for your convenient reference.

You should randomly partition the set of images into the training set and the testing set (for example, half-half). Eigenfaces and sparse-representation dictionary should only be constructed from the training set.

Evaluate your algorithms by plotting the receiver operating characteristic (ROC) curve – correct classification rate versus false alarm rate. For each test case, you should select a test image randomly from the testing set. Repeat the test enough times for your ROC curve to stabilized.

Due date: **Tuesday, Apr. 18** in lecture